## Ethylene Oxide Treatment

In this sheet, air emissions and the quantity treated on site is calculated for ethylene oxide.
**Catalytic oxidizer:** Emissions from catalytic oxidizers are estimated based on 2016 testing that indicates 0.162 pounds per hour of emissions for 2015-2018. Emissions for 2019 are based on the 1 ppm figure from NESHAP Subpart O standard for aeration room vents. This is a change from 2018 RY based on indication of potential higher emissions in 2019 vs. 2016 emissions testing data, but without readily available data to calculate.
**Scrubber:** Emissions from the scrubber are estimated based on assuming all ethylene oxide is fed the

| Ethylene Oxide Use | 2016 | Comments | 2017 | Comments | 2018 | Comments | 2019 | Comments |
|---|---|---|---|---|---|---|---|---|
| Ethylene Oxide Use | 354,000 lb | | 356,800 lb | | 378,000 lb | | 395,600 lb | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | **Comments** | | **Comments** | | **Comments** | | **Comments** |
| Hours of Operation | 8,784 hr/yr | | 8,760 hr/yr | | 8,760 hr/yr | | 8,760 hr/yr | |
| Oxidizer A - Ethylene Oxide Emissions | | | | | | | 1 ppm | |
| | | | | | | | 25,828 scfm | 1 ppm figure from NESHAP Subpart O standard for aeration room vents. Change from 2018 RY based on indication of potential higher emissions in 2019 vs. 2016 emissions testing data, but without readily available data to calculate. |
| | | Note: no change from reported emissions from the catalytic oxidizers. Calculations taken from file "PlantVOCHAPnew_v1.0" | | Note: no change from reported emissions from the catalytic oxidizers. Calculations taken from file "PlantVOCHAPnew_v1.0" | | Note: no change from reported emissions from the catalytic oxidizers. Calculations taken from file "PlantVOCHAPnew_v1.0" | 0.177 lb/hr Ethylene Oxide Emissions | |
| Oxidizer B - Ethylene Oxide Emissions | | | | | | | 1 ppm | |
| | | | | | | | 25,351 scfm | |
| | | | | | | | 0.174 lb/hr Ethylene Oxide Emissions | |
| | | | | | | | 0.351 lb/hr Ethylene Oxide Emissions | |
| Ethylene Oxide Treated in Oxidizers & Scrubbers | 337,341 lb Ethylene Oxide | | 341,355 lb Ethylene Oxide | | 360,966 lb Ethylene Oxide | | 376,085 lb Ethylene Oxide | |
| Total Oxidizer Emissions | 1,423 lb/yr Ethylene Oxide Emissions, total both oxidizers | | 1,419 lb/yr Ethylene Oxide Emissions, total both oxidizers | | 1,419 lb/yr Ethylene Oxide Emissions, total both oxidizers | | 3,077 lb/yr Ethylene Oxide Emissions, total both oxidizers | |
| **SN-101 Scrubber** | | **Comments** | | **Comments** | | **Comments** | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 354,000 lb Ethylene Oxide | | 356,800 lb Ethylene Oxide | | 378,000 lb Ethylene Oxide | | 395,600 lb Ethylene Oxide | |
| | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for previous year importing. | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for previous year importing. | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| Scrubber Control | 99.00% | | 99.00% | | 99.00% | | 99.00% | |
| Scrubber Emissions | 3,540 lb Ethylene Oxide | | 3,568 lb Ethylene Oxide | | 3,780 lb Ethylene Oxide | | 3,956 lb Ethylene Oxide | |
| **General Fugitive Emissions** | | **Comments** | | **Comments** | | **Comments** | | **Comments** |
| Ethylene Oxide Use | 354,000 lb | | 356,800 lb | | 378,000 lb | | 395,600 lb | |
| | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. This is a change from prior calculations that used an emission factor of 1% of emissions. | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. This is a change from prior calculations that used an emission factor of 1% of emissions. | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. This is a change from prior calculations that used an emission factor of 1% of emissions. | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. This is a change from prior calculations that used an emission factor of 1% of emissions. |
| General Fugitive Emissions | 0.5% | | 0.5% | | 0.5% | | 0.5% | |
| | 1,770 lb | | 1,784 lb | | 1,890 lb | | 1,978 lb | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | **Comments** | | **Comments** | | **Comments** | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 lb | From 2014 ERM calculations | 2.23 lb | From 2014 ERM calculations | 2.23 lb | From 2014 ERM calculations | 2.23 lb | From 2014 ERM calculations |
| 2019 Batches | 1 batches | From K. Steelman 6/24/2020 data | 51 batches | From K. Steelman 6/24/2020 data | 195 batches | From K. Steelman 6/24/2020 data | 181 batches | From K. Steelman 6/24/2020 data |
| Ethylene Oxide Emissions | 2 lb | | 114 lb | | 435 lb | | 404 lb | |
| **Total Ethylene Oxide Emissions** | | **Comments** | | **Comments** | | **Comments** | | **Comments** |
| SN-101 Scrubber | 3,540 lb | | 3,568 lb | | 3,780 lb | | 3,956 lb | |
| SN-116 and SN-117 CO | 1,423 lb | | 1,419 lb | | 1,419 lb | | 3,077 lb | |
| SN-119 Sterilization Chamber #7 | 2 lb | | 114 lb | | 435 lb | | 404 lb | |
| General Fugitives | 1,770 lb | | 1,784 lb | | 1,890 lb | | 1,978 lb | |
| Total Ethylene Oxide Emissions | 6,735 lb | | 6,885 lb | | 7,524 lb | | 9,415 lb | |

## Inputs & Summary

| Ethylene Oxide Emissions (lbs) | 2019 | 2020 Period 1 | 2020 Pd. 2-7 | 2020 |
|---|---|---|---|---|
| SN-101 Scrubber | 3,795 | 505 | 654 | 1,159 |
| SN-116 and SN-117 CO | 3,077 | 4,244 | 268 | 4,511 |
| SN-119 Sterilization Chamber #7 | 404 | 75 | 4 | 78 |
| General Fugitives | 1,897 | 327 | 1,725 | 2,052 |
| Total Ethylene Oxide Emissions | 9,173 | 5,151 | 2,650 | 7,801 |

**Ethylene Oxide Use from Dave Miller**

Quantity Treated on-Site (lbs) 402,677

| Period | EO Use (lbs) |
|---|---|
| 1 | 65,487 |
| 2 | 59,570 |
| 3 | 73,574 |
| 4 | 29,193 |
| 5 | 36,294 |
| 6 | 23,670 |
| 7 | 122,690 |
| 2020 Total | 410,477 |

Period 1 (1/1-2/13) operated with high emissions from Cat Ox units
Period 2 (2/25-4/22) operated with TOs after the CatOx and dry beds after chamber #7 and after the scrubber
Period 3 (4/23-6/24) operated with one TO after one CatOx and dry beds after the other CatOx, scrubber, and chamber #7
Period 4 (6/25-7/12) operated with dry beds after CatOx and chamber 7 and dry beds after the scrubber
Period 5 (7/13-8/4) operated with dry beds after CatOx and chamber 7 and a TO after the scrubber
Period 6 (8/5-8/24) operated as period 5 did but with new catalyst in the north oxidizer
Period 7 (8/25-12/31) operated as period 6 did but with new catalyst in the south oxidizer as well

EO use calculated from JDE system. Each tank used contains 400 pounds of ethylene oxide. Only 394.5 pounds of each is used per EO supplier.

**Timeline from Kevin Beckham & Dave Miller**

Operation shut down – 2/11/20
Operation started up – 2/25/20
TOs added post CatOx units for polishing
Dry beds added post Scrubber for polishing
Dry beds added for Vessel 7 rear chamber exhaust
South TO replaced with South dry bed chain (14) for polishing – 4/23/20
North TO replaced with North dry bed chain (14) for polishing – 6/25/20
Dry beds post scrubber replaced by TO unit for polishing – 7/13/20
Catalyst in CatOx replaced - 8/5/20 (north) & 8/25/20 (south)

**Assumptions**

For whole year, assumed 77.1% EO to scrubber and 22.9% to catalytic oxidizers per Tim Stafford
Dry bed efficiencies are based on EO concentrations per text box below.
Thermal oxidizers (TOs) are 98% efficient per manufacturer

**Efficiencies estimated by Dry Bed Supplier**

99% at > 10 ppmv inlet
98% at 5-10 ppmv inlet
95% at 1-4 ppmv inlet
90% at 0.5-0.9 ppmv inlet
75% at 0.2-0.4 ppmv inlet
50% at 0.05-0.1 ppmv inlet

Supplier contact:
Randal Nicolli, P.E.
Engineering Manager
Advanced Air Technologies, Inc.
300 Sleeseman Drive
Corunna, MI 48817
(989) 743-5544
rnicolli@advairtech.com

| EtO Emissions - Previous Estimate | 2020 | 2021 |
|---|---|---|
| SN-101 Scrubber | 759 | 63 |
| SN-116 and SN-117 CO | 4,564 | 461 |
| SN-119 Sterilization Chamber #7 | 80 | 203 |
| General Fugitives | 2,029 | 1,539 |
| Total Ethylene Oxide Emissions | 7,432 | 2,266 |

| EtO Emissions - Current Estimate | 2020 | 2021 | 2022 |
|---|---|---|---|
| SN-101 Scrubber | 1,159 | 64 | 64 |
| SN-116 and SN-117 CO | 4,511 | 11 | 11 |
| SN-119 Sterilization Chamber #7 | 78 | 0 | 0 |
| General Fugitives | 2,052 | 1,557 | 0 |
| Total Ethylene Oxide Emissions | 7,801 | 1,632 | 75 |

# Baxter Healthcare Toxic Release Inventory

Period 1 (1/1-2/13) operated with high emissions from Cat Ox units

start 1/1/20 0:00 Days 43.99999

end 2/13/20 23:59 Hours 1056

## Site Specific Factors 2020 - Period 1

| | | | |
|---|---|---|---|
| **Ethylene Oxide Data** | | | **Comments** |
| Ethylene Oxide Used | 65,487 | lb/period | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | |
| | | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | **Comments** |
| Hours of Operation | 1,056 | hr/period | |
| So. Oxidizer - Ethylene Oxide Emissions | 12.47 | ppm | Source for the concentrations and flowrates is data provided by LCH. |
| | 28,400 | scfm | |
| | 2.431 | lb/hr Ethylene Oxide Emissions | |
| No. Oxidizer - Ethylene Oxide Emissions | 7.5 | ppm | |
| | 30,850 | scfm | |
| | 1.588 | lb/hr Ethylene Oxide Emissions | |
| Total Oxidizer Emissions | 4.019 | lb/hr Ethylene Oxide Emissions | |
| Total Oxidizer Emissions | 4,244 | lb/period Ethylene Oxide | |
| | | | |
| **SN-101 Scrubber** | | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 50,490 | lb Ethylene Oxide | |
| Scrubber Control | 99.00% | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| Scrubber Emissions | 505 | lb/period Ethylene Oxide | |
| | | | |
| **General Fugitive Emissions** | | | **Comments** |
| Ethylene Oxide Used | 65,487 | lb | |
| General Fugitive Emissions | 0.5% | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 327 | lb | |
| | | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | From 2014 ERM calculations |
| Batches | 34 | batches | |
| Ethylene Oxide Emissions | 75 | lb | |
| | | | |
| **Total Ethylene Oxide Emissions** | | | **Comments** |
| SN-101 Scrubber | 505 | lb | |
| SN-116 and SN-117 CO | 4,244 | lb | |
| SN-119 Sterilization Chamber #7 | 75 | lb | |
| General Fugitives | 327 | lb | |
| Total Ethylene Oxide Emissions | 5,151 | lb | |

# Baxter Healthcare Toxic Release Inventory

## Site Specific Factors 2020 - Period 2

Period 2 (2/25-4/22) operated with TOs after the CatOx and dry beds after chamber #7 and after the scrubber.

| | | | |
|---|---|---|---|
| start | 2/25/20 0:00 | Days | 58 |
| end | 4/22/20 23:59 | Hours | 1392 |

| | | | | | |
|---|---|---|---|---|---|
| **Ethylene Oxide Data** | | | | | **Comments** |
| Ethylene Oxide Used | 59,570 | lb/period | | | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | | | |
| | | | | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | | | **Comments** |
| Hours of Operation | 1,392 | hr/period | | | Source for the concentrations emitted from the oxidizers is the testing summarized in the pdf on the Period 1 sheet. |
| | | | | | |
| So. Oxidizer - Ethylene Oxide Emissions | 12.47 | ppm | | | |
| | 28,400 | scfm | | | |
| | 2.431 | lb/hr | Ethylene Oxide Emissions | | |
| | | | | | |
| | | | | | |
| No. Oxidizer - Ethylene Oxide Emissions | 7.5 | ppm | | | |
| | 30,850 | scfm | | | |
| | 1.588 | lb/hr | Ethylene Oxide Emissions | | |
| | | | | | |
| Total Catalytic Oxidizer Emissions to Thermal Oxidiz | 4.019 | lb/hr | Ethylene Oxide Emissions | | |
| Thermal Oxidizer Emissions | 0.080 | lb/hr | Ethylene Oxide Emissions | | |
| | | | | | |
| Total Thermal Oxidizer Emissions | 112 | lb/period | Ethylene Oxide Emissions, total | | |
| | | | | | |
| **SN-101 Scrubber** | | | | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 45,928 | lb | Ethylene Oxide | | |
| Scrubber Control | 99.00% | | | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| | | | | | |
| Emissions from Scrubber | 459 | lb | Ethylene Oxide | | Efficiency estimated based on low EO conc. fed to the beds b/c high scrubber efficiency. |
| Emissions from dry beds (50% efficiency) | 230 | lb | Ethylene Oxide | | |
| | | | | | |
| **General Fugitive Emissions** | | | | | **Comments** |
| Ethylene Oxide Used | 59,570 | lb | | | |
| General Fugitive Emissions | 0.5% | | | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 298 | lb | | | |
| | | | | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | | | From 2014 ERM calculations |
| Batches | 29 | batches | | | Estimated 1 every 2 days per 2019 operation |
| Emissions from dry beds (99% efficiency) | 1 | lb | | | Efficiency based on info from supplier (text box) with conc. assumed >10 ppm (no upstream control). |
| | | | | | |
| **Total Ethylene Oxide Emissions** | | | | | **Comments** |
| SN-101 Scrubber | 230 | lb | | | |
| SN-116 and SN-117 CO | 112 | lb | | | |
| SN-119 Sterilization Chamber #7 | 1 | lb | | | |
| General Fugitives | 298 | lb | | | |
| Total Ethylene Oxide Emissions | 640 | lb | | | |

# Baxter Healthcare Toxic Release Inventory

# Site Specific Factors 2020 - Period 3

Period 3 (4/23-6/25) operated with a TO after No. CatOx and dry beds after So. CatOx, scrubber, and chamber #7

start 4/23/20 0:00 Days 63.99999

end 6/25/20 23:59 Hours 1536

| | | | | Comments |
|---|---|---|---|---|
| **Ethylene Oxide Data** | | | | |
| Ethylene Oxide Used | 73,574 | lb/period | | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | | |
| Hours of Operation | 1,536 | hr/period | | Source for the concentrations emitted from the oxidizers is the testing summarized in the pdf on the Period 1 sheet. |
| So. Oxidizer - Ethylene Oxide Emissions | 12.47 | ppm | | |
| | 28,400 | scfm | | |
| | 2.431 | lb/hr | Ethylene Oxide Emissions | |
| Dry Bed Emissions | 0.024 | lb/hr | Ethylene Oxide Emissions | |
| No. Oxidizer - Ethylene Oxide Emissions | 7.5 | ppm | | |
| | 30,850 | scfm | | |
| | 1.588 | lb/hr | Ethylene Oxide Emissions | |
| Thermal Oxidizer Emissions | 0.032 | lb/hr | Ethylene Oxide Emissions | |
| Total Emissions | 0.056 | lb/hr | Ethylene Oxide Emissions | |
| Total Emissions | 86 | lb/period | Ethylene Oxide Emissions, total | |
| **SN-101 Scrubber** | | | | |
| Pre-Scrubber Ethylene Oxide | 56,726 | lb | Ethylene Oxide | |
| Scrubber Control | 99.00% | | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| Emissions from Scrubber | 567 | lb | Ethylene Oxide | Efficiency estimated based on low EO conc. fed to the beds b/c high scrubber efficiency. |
| Emissions from dry beds (50% efficiency) | 284 | lb | Ethylene Oxide | |
| **General Fugitive Emissions** | | | | |
| Ethylene Oxide Used | 73,574 | lb | | |
| General Fugitive Emissions | 0.5% | | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 368 | lb | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | | |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | | From 2014 ERM calculations |
| Batches | 32 | batches | | Estimated 1 every 2 days per 2019 operation |
| Emissions from dry beds (99% efficiency) | 1 | lb | | Efficiency based on info from supplier (text box) with conc. assumed >10 ppm (no upstream control). |
| **Total Ethylene Oxide Emissions** | | | | |
| SN-101 Scrubber | 284 | lb | | |
| SN-116 and SN-117 CO | 86 | lb | | |
| SN-119 Sterilization Chamber #7 | 1 | lb | | |
| General Fugitives | 368 | lb | | |
| Total Ethylene Oxide Emissions | 738 | lb | | |

# Baxter Healthcare Toxic Release Inventory

# Site Specific Factors 2020 - Period 4

Period 4 (6/26-7/12) operated with dry beds after CatOx and chamber 7 and dry beds after the scrubber

| | | | | |
|---|---|---|---|---|
| start | 6/26/20 0:00 | Days | 16.99999 |
| end | 7/12/20 23:59 | Hours | 407.9997 |

| | | | | | |
|---|---|---|---|---|---|
| **Ethylene Oxide Data** | | | | **Comments** |
| Ethylene Oxide Used | 29,193 | lb/period | | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | | |
| | | | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | | **Comments** |
| Hours of Operation | 408 | hr/period | | Source for the concentrations emitted from the oxidizers is the testing summarized in the pdf on the Period 1 sheet. |
| | | | | |
| So. Oxidizer - Ethylene Oxide Emissions | 12.47 | ppm | | |
| | 28,400 | scfm | | |
| | 2.431 | lb/hr | Ethylene Oxide Emissions | |
| Dry Bed Emissions | 0.024 | lb/hr | Ethylene Oxide Emissions | |
| | | | | |
| No. Oxidizer - Ethylene Oxide Emissions | 7.5 | ppm | | |
| | 30,850 | scfm | | |
| | 1.588 | lb/hr | Ethylene Oxide Emissions | |
| Dry Bed Emissions | 0.032 | lb/hr | Ethylene Oxide Emissions | |
| | | | | |
| Total Emissions | 0.056 | lb/hr | Ethylene Oxide Emissions | |
| Total Emissions | 23 | lb/period | Ethylene Oxide Emissions, total | |
| | | | | |
| **SN-101 Scrubber** | | | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 22,508 | lb | Ethylene Oxide | |
| Scrubber Control | 99.00% | | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| | | | | |
| Emissions from Scrubber | 225 | lb | Ethylene Oxide | Efficiency estimated based on low EO conc. fed to the beds b/c high scrubber efficiency. |
| Emissions from dry beds (50% efficiency) | 113 | lb | Ethylene Oxide | |
| | | | | |
| **General Fugitive Emissions** | | | | **Comments** |
| Ethylene Oxide Used | 29,193 | lb | | |
| General Fugitive Emissions | 0.5% | | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 146 | lb | | |
| | | | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | | From 2014 ERM calculations |
| Batches | 9 | batches | | Estimated 1 every 2 days per 2019 operation |
| Emissions from dry beds (99% efficiency) | 0.2 | lb | | Efficiency based on info from supplier (text box) with conc. assumed >10 ppm (no upstream control). |
| | | | | |
| **Total Ethylene Oxide Emissions** | | | | **Comments** |
| SN-101 Scrubber | 113 | lb | | |
| SN-116 and SN-117 CO | 23 | lb | | |
| SN-119 Sterilization Chamber #7 | 0 | lb | | |
| General Fugitives | 146 | lb | | |
| Total Ethylene Oxide Emissions | 282 | lb | | |

# Baxter Healthcare Toxic Release Inventory

## Site Specific Factors 2020 - Period 5

Period 5 (7/13-8/4) operated with dry beds after CatOx and chamber 7 and a TO after the scrubber

| | | | | |
|---|---|---|---|---|
| start | 7/13/20 0:00 | Days | 22.99999 |
| end | 8/4/20 23:59 | Hours | 551.9997 |

| | | | | | |
|---|---|---|---|---|---|
| **Ethylene Oxide Data** | | | | | **Comments** |
| Ethylene Oxide Used | 36,294 | lb/period | | | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | | | |
| | | | | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | | | **Comments** |
| Hours of Operation | 552 | hr/period | | | Source for the concentrations emitted from the oxidizers is the testing summarized in the pdf on the Period 1 sheet. |
| | | | | | |
| So. Oxidizer - Ethylene Oxide Emissions | 12.47 | ppm | | | |
| | 28,400 | scfm | | | |
| | 2.431 | lb/hr | Ethylene Oxide Emissions | | |
| Dry Bed Emissions | 0.024 | lb/hr | Ethylene Oxide Emissions | | |
| | | | | | |
| No. Oxidizer - Ethylene Oxide Emissions | 7.5 | ppm | | | |
| | 30,850 | scfm | | | |
| | 1.588 | lb/hr | Ethylene Oxide Emissions | | |
| Dry Bed Emissions | 0.032 | lb/hr | Ethylene Oxide Emissions | | |
| | | | | | |
| Total Emissions | 0.056 | lb/hr | Ethylene Oxide Emissions | | |
| Total Emissions | 31 | lb/period | Ethylene Oxide Emissions, total | | |
| | | | | | |
| **SN-101 Scrubber** | | | | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 27,983 | lb | Ethylene Oxide | | |
| Scrubber Control | 99.00% | | | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| | | | | | |
| Emissions from Scrubber | 280 | lb | Ethylene Oxide | | Efficiency estimated based on low EO conc. fed to the beds b/c high scrubber efficiency. |
| Emissions from thermal oxidizer (98% efficiency) | 6 | lb | Ethylene Oxide | | |
| | | | | | |
| **General Fugitive Emissions** | | | | | **Comments** |
| Ethylene Oxide Used | 36,294 | lb | | | |
| General Fugitive Emissions | 0.5% | | | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 181 | lb | | | |
| | | | | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | | | From 2014 ERM calculations |
| Batches | 12 | batches | | | Estimated 1 every 2 days per 2019 operation |
| Emissions from dry beds (99% efficiency) | 0.3 | lb | | | Efficiency based on info from supplier (text box) with conc. assumed >10 ppm (no upstream control). |
| | | | | | |
| **Total Ethylene Oxide Emissions** | | | | | **Comments** |
| SN-101 Scrubber | 6 | lb | | | |
| SN-116 and SN-117 CO | 31 | lb | | | |
| SN-119 Sterilization Chamber #7 | 0 | lb | | | |
| General Fugitives | 181 | lb | | | |
| Total Ethylene Oxide Emissions | 218 | lb | | | |

# Baxter Healthcare Toxic Release Inventory

## Site Specific Factors — 2020 - Period 6

Period 6 (8/5-8/24) operated as period 5 did but with new catalyst in the north oxidizer

start 8/5/20 0:00 Days 19.99999

end 8/24/20 23:59 Hours 479.9997

| | | | | Comments |
|---|---|---|---|---|
| **Ethylene Oxide Data** | | | | |
| Ethylene Oxide Used | 23,670 | lb/period | | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | | **Comments** |
| Hours of Operation | 480 | hr/period | | Source for the concentrations emitted from the south oxidizers is the testing summarized in the pdf on the Period 1 sheet. |
| So. Oxidizer - Ethylene Oxide Emissions | 12.47 | ppm | | |
| | 28,400 | scfm | | |
| | 2.431 | lb/hr | Ethylene Oxide Emissions | |
| Dry Bed Emissions | 0.024 | lb/hr | Ethylene Oxide Emissions | |
| No. Oxidizer/Dry Bed Ethylene Oxide Emissions | 0.003 | ppm | | Dave Miller indicated that Montrose sampled the stack from the North Cat Ox & Dry Bed train in April 2021 and found ethylene oxide to be non-detect. The detection limit was 6 ppb. We use half the detection limit. |
| | 30,850 | scfm | | |
| | 0.001 | lb/hr | Ethylene Oxide Emissions | |
| Total Emissions | 0.025 | lb/hr | Ethylene Oxide Emissions | |
| Total Emissions | 12 | lb/period | Ethylene Oxide Emissions, total | |
| **SN-101 Scrubber** | | | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 18,250 | lb | Ethylene Oxide | |
| Scrubber Control | 99.00% | | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| Emissions from Scrubber | 182 | lb | Ethylene Oxide | Efficiency estimated based on low EO conc. fed to the beds b/c high scrubber efficiency. |
| Emissions from thermal oxidizer (98% efficiency) | 4 | lb | Ethylene Oxide | |
| **General Fugitive Emissions** | | | | **Comments** |
| Ethylene Oxide Used | 23,670 | lb | | |
| General Fugitive Emissions | 0.5% | | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 118 | lb | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | | From 2014 ERM calculations |
| Batches | 10 | batches | | Estimated 1 every 2 days per 2019 operation |
| Emissions from dry beds (99% efficiency) | 0.2 | lb | | Efficiency based on info from supplier (text box) with conc. assumed >10 ppm (no upstream control). |
| **Total Ethylene Oxide Emissions** | | | | **Comments** |
| SN-101 Scrubber | 4 | lb | | |
| SN-116 and SN-117 CO | 12 | lb | | |
| SN-119 Sterilization Chamber #7 | 0 | lb | | |
| General Fugitives | 118 | lb | | |
| Total Ethylene Oxide Emissions | 134 | lb | | |

# Baxter Healthcare Toxic Release Inventory

## Site Specific Factors 2020 - Period 7

Period 7 (8/25-12/31) operated as period 6 did but with new catalyst in the south oxidizer as well

start 8/25/20 0:00 Days 129

end 12/31/20 23:59 Hours 3096

| | | | | | |
|---|---|---|---|---|---|
| **Ethylene Oxide and Ethylene Glycol Data** | | | | | **Comments** |
| Ethylene Oxide Used | 122,690 | lb/period | | | |
| Ethylene Oxide Mol. Wt. | 44.05 | lb/lbmol | | | |
| **SN-116 and SN-117 Catalytic Oxidizers** | | | | | **Comments** |
| Hours of Operation | 3,096 | hr/period | | | |
| so. Oxidizer/Dry Bed Ethylene Oxide Emissions | 0.003 | ppm | | | |
| | 28,400 | scfm | | | |
| | 0.001 | lb/hr | Ethylene Oxide Emissions | | |
| No. Oxidizer/Dry Bed Ethylene Oxide Emissions | 0.003 | ppm | | | Dave Miller indicated that Montrose sampled the stack from both the Cat Ox & Dry Bed trains in April 2021 and found ethylene oxide to be non-detect. The detection limit was 6 ppb. We use half the detection limit. |
| | 30,850 | scfm | | | |
| | 0.001 | lb/hr | Ethylene Oxide Emissions | | |
| Total Emissions | 0.001 | lb/hr | Ethylene Oxide Emissions | | |
| Total Emissions | 4 | lb/period | Ethylene Oxide Emissions, total | | |
| **SN-101 Scrubber** | | | | | **Comments** |
| Pre-Scrubber Ethylene Oxide | 94,594 | lb | Ethylene Oxide | | |
| Scrubber Control | 99.00% | | | | 99% figure from NESHAP Subpart O standard for sterilization chamber vents. Same factor as used for 2018 RY. |
| Emissions from Scrubber | 946 | lb | Ethylene Oxide | | |
| Emissions from thermal oxidizer (98% efficiency) | 19 | lb | Ethylene Oxide | | Efficiency estimated based on low EO conc. fed to the beds b/c high scrubber efficiency. |
| **General Fugitive Emissions** | | | | | **Comments** |
| Ethylene Oxide Used | 122,690 | lb | | | |
| General Fugitive Emissions | 0.5% | | | | EPA factor from Federal Register, 12/12/2019. Different factor used in previous years. |
| | 613 | lb | | | |
| **SN-119 Sterilization Chamber #7 Rear Chamber Exhaust** | | | | | **Comments** |
| Ethylene Oxide Vented Per Batch | 2.23 | lb | | | From 2014 ERM calculations |
| Batches | 65 | batches | | | Estimated 1 every 2 days per 2019 operation |
| Emissions from dry beds (99% efficiency) | 1 | lb | | | Efficiency based on info from supplier (text box) with conc. assumed >10 ppm (no upstream control). |
| **Total Ethylene Oxide Emissions** | | | | | **Comments** |
| SN-101 Scrubber | 19 | lb | | | |
| SN-116 and SN-117 CO | 4 | lb | | | |
| SN-119 Sterilization Chamber #7 | 1 | lb | | | |
| General Fugitives | 613 | lb | | | |
| Total Ethylene Oxide Emissions | 638 | lb | | | |